REMARKS

Amendments to the Claims

By this amendment, claims 1 and 11 are amended. Claims 24 to 27 are cancelled. Claims 1 to 23 remain In the application.

Claim objections

Claims 2, 3, 6, 8, 9, 12-14, 16 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim, since these claims are relying on the use of the cell and the electrolyte.

These objections have been overcome by amending claim 1 to positively recite that the cell contains the molten salt electrolyte in which a compound of said metal to be electrowon is dissolved. In this respect, the applicants submit that a molten salt electrolyte in which a compound of a metal being electrowon constitutes a limiting feature of a cell for electrowinning a metal.

Objected-to claim 2 specifies that cell of claim 1 is arranged to promote during use an electrolyte circulation from and towards the cathode and moreover that the conductive surface is exposed to molten electrolyte that circulates towards the cathode and that contains the species of said element(s). This properly further defines the cell of claim 1 with its electrolyte.

Objected-to claim 3 further specifies that the conductive collector surface is positioned outside a gap spacing the anode and the cathode, the conductive surface being electrically connected to a means for applying a potential. This properly further defines the cell of claim 1 with its electrolyte.

Objected-to claim 6 further specifies that the potential of the conductive collector surface is set by its position relative to the anode and cathode. This properly further defines the cell of claim 1.

Objected-to claim 8 specifies that the electrolyte contains dissolved product metal and/or another metal that during use is/are oxidised on the conductive collector surface to pass an electric charge that reduces species of said element(s) on the conductive surface. This further specifies the cell of claim 1 and its electrolyte.

Objected-to claim 9 specifies that the electrolyte is a sodium-containing electrolyte and said other metal is sodium that is reduced from the electrolyte. This further specifies claim 1 and its electrolyte.

Objected-to claim 12, which has been corrected to depend on claim 11, specifies that the metal-based surface (of the collector) comprises one or more listed metals. This further specifies the collector surface of claims 1 and 11.

Objected-to claim 13 specifies that the species of said element(s) comprise species of at least one metal selected from a given group of metals. This further specifies the species of elements defined in claim 1.

Objected-to claim 14 specifies that the anode has a surface that comprises one or more of said metal(s) in metallic form and/or in a compound. This further specifies the anode of claim 1.

Objected-to claim 16 specifies that the species of said element(s) defined in claim 1 comprise species of at least one metalloid or non metal such as sulphur. This further specifies the element(s) to be removed, as defined in claim 1.

The applicant believes that the amendment to claim 1 overcomes all objections raised against claims 2, 3, 6, 8, 9, 12-14 and 16 which are all in proper dependent form as outlined above.

Claim Rejections – 35 USC § 112

Claims 12, 26 and 27 are rejected under 35 USC§112 as being indefinite.

Claim 12 was rejected as indefinite in respect of there being no metal-based surface set forth in claims 1 to 10. This objection has been removed by correcting claim 12 to make it depend on claim 11 which has proper antecedent basis for the metal-based surface.

Claims 26 and 27 are cancelled, obviating the rejection of these claims.

Claim Rejections – 35 USC § 102

Claims 1, 2, 5, 7, 17 and 24-27 are rejected under 35 USC 102(b) as being anticipated by Das et al (US 4,115,215). The applicants respectfully disagree with this rejection for the following reasons.

As set out in the Office Action:

Das et al disclose a process for purifying aluminium alloys wherein molten aluminium in a container having a porous wall that contains molten aluminium in the container and is permeable by the molten electrolyte. Aluminium is electrolytically transported through the porous wall to a cathode that separates the aluminium from the alloying constituents. The cell has an inner and outer container, wherein the cathode is found in the electrolyte and underneath the cathode is a receptacle that receives purified aluminium that is precipitated or deposited at the cathode. The receptacle has an outlet through which the purified aluminium can be removed continuously at a rate that is commensurate with the rate of deposition at the cathode. The inner container has a porous wall that is permeable by an ion containing one or more aluminium atoms which can be electrolytically transported through the wall to the cathode. An outlet is provided so that residues or alloying constituents remaining after aluminium has been separated therefrom can be removed. The side or the inner container serves as the anode of the cell.

Das et al is thus concerned with an aluminium purification arrangement for purifying an aluminium alloy 32 in a container 30 held at anodic potential. Das et al does not describe a cell for electrowinning a metal from a compound thereof dissolved in a molten electrolyte. Electrolytic aluminium purification and aluminium electrowinning by electrolysis of a dissolved compound are different processes.

In particular, Das et al does not disclose an electrowinning cell containing a molten salt electrolyte in which a compound of a metal to be electrowon is dissolved.

Furthermore, Das et al does not, as required by applicants' claim, have: a collector for removing species of said element(s) from the electrolyte, said collector having an electrically conductive surface in contact with the molten electrolyte, the conductive collector surface being during use at a potential that is:

- less negative than the cathodic potential of the produced metal to inhibit reduction thereon of species of the metal to be produced; and
- at or more negative than the reduction potential of the species of said element(s) to allow reduction thereof on the conductive collector surface,

the cell being so arranged that species of said element(s) are reduced on the conductive collector surface rather than on the cathode so as to inhibit contamination of the product metal by said element(s).

In Das et al the container 30 (Fig. 1) and 30' (Fig. 2) is at anodic potential. It is permeable to A1+ ions which pass through it. However, the Al does not "collect" on the container 30, 30' which is not a "collector". In particular, the container 30, 30' contains constituents such

as silicon, iron and the like which do not pass through the permeable wall of the container. However, these retained constituents are not reduced and do not deposit on the container surface. The container 30. 30' is thus not a collector in the sense of the claimed invention.

In Das et al Fig. 2, 22 is the cathode on which purified aluminium collects. However this is not a collector within the meaning of applicants' claim because it is not at a potential less negative that the cathode potential, and moreover no other metal species are reduced there; as the metal being deposited is pure aluminium.

It follows that applicants claim 1 is novel over Das et al. The applicants therefore request that this rejection be withdrawn.

Claims 2-20 all depend on claim 1 and are novel for the same reasons. Claims 21-23 also depend indirectly on claim 1, and are novel for the same reasons.

Unobviousness 35 USC 103

The citation Das et al belongs to a different technological area, namely aluminium purification or refining as opposed to aluminium electrowinning according to applicants claims.

Moreover, Das et al has no description or suggestion to use a collector at a potential more negative that the cathodic potential (to inhibit reduction of species of the metal being electrowon) but more negative than the reduction potential of the contaminating species, whereby species of the contaminating element(s) are reduced on the collector surface rather that on the cathode so as to inhibit contamination of the product metal by said element(s). It follows that a skilled person starting from Das et al cannot arrive at the claimed invention in any obvious way.

The applicants therefore submit that all claims are novel and unobvious over Das et al.

Respectfully submitted,

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